COMPUTER TECHNOLOGY - A TOOL IN THE HAND OF THE ARTIST?

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ABSTRACT
Experimenting around with new media is essential for artistic work and the creation of new art forms. Looking at the Computer Demoscene, a European subculture, gives an insight into a generation of ambitious hobbyists who took up the heritage of the American hacker culture. Artists express themselves by experimenting with computer technology. With their practices of real-time-generated images and sound this youth culture scene extends the boundaries of technology. In the following, the scene will be analyzed to outline characteristics and criteria for ensuring a preservation of the artifacts of this sub-cultural art form.

INTRODUCTION
The expression "tool in the hands of the artist" has a tradition. Currently there is lively debate in art history taking place, as to whether the computer can be understood as a "tool of practical art" (Institut f. Mathematik u. Informatik 2012), as a "production and presentation device" (Serexhe 2011), as an "artistic means of expression" (Klütsch 2007), "a processed material" (Botz 2011) or an experience to "feel of materiality" (Heikilä 2011). At the same time the idea of an artist only owning a software license as a tool has been established (Serexhe 2012). This discourse has an impact on the overall understanding and awareness of the value of computer-based creativity and the identification of sustaining and preserving artistic work and its components and will also have for future generations.

Only through deep understanding of a born-digital artwork, the use of materials and tools, the creative process and the social context, it is possible to develop solutions for a sustainable preservation and conservation strategy. Thus, the technical and semantic aspects of the Computer Demoscene representing complex dynamic media objects are being discussed.

TECHNOLOGY RELATED SUBCULTURE
Niche cultures arise, driven by technical development, forming their own norms, values and specific practices. It is not unusual for historiography that historical milestones are neglected because of commercial interests. Documentation often is incomplete or inconsistent. The same applies to niches in contemporary media arts like the Computer Demoscene which requires more attention than it currently receives. Only few research publications exist (Silvast and Reunanen 2004).

The Computer Demoscene
The Computer Demoscene is one example for a subculture that still appears on the edge of the scientific domain. With its "Demo art" this creative subculture developed its own artistic expression. Having a deep knowledge on the machines and patience on examination, artists program and develop their artwork using sophisticated mathematical operations for manipulation and editing. The multimedia work "Demo" that arises consists of text, images and audio data encoded in zeros and ones.

The Computer Demoscene spread in the days of the Commodore 64 which has been "the most popular platform for a long time" (Stannes 2012). In the early 80s a young anarchistic subculture emerged from hobby programmers and the Demoscene has become a community that creatively uses computer technology (Hitzler and Niederbacher 2010). Until the 90s the scene was closely associated with the "Cracker Scene". Demo artists initially developed small presentations in the form of concise thematic introductions for cracked home computer games. This so-called "Crack-Intro" was a start screen with logo of the cracker group, text messages and graphics as well as music. To complement their skills Demo Artists formed groups of programmers, graphics artists and musicians to demonstrate what they can get out of the given hardware. Over time artworks of real-time graphics, motion graphics and visual arts with more complex effects and a variety of elements were designed. Several forms of the Demo art originated which will be described and progressively analyzed below.

CHARACTERISTIC OF DEMOScene WORKS
To conceive the defining characteristics of the Computer Demoscene a short historical overview will be given.

Chronological Milestones
The roots of the scene go back to the beginning of
Computer-generated art in the early 50s. For a long time the works of the pioneers B. Laposky and H.W. Franke had been representative for achievements in this field (Goodman 1987). In the early 60s C. Csuri used computer technology to generate the first real-time animation. His artwork “Hummingbird” is exemplary for successful programming and the usage of computer technology as a medium for art (Csuri 2012). In the 70s computer technology reaches the masses with wide spread gaming platforms and games. When starting a copied game in the 80s, the “Cracker-Intro” also called “Crack-Intro” or “Cracktro” came up. A classic Cracktro composed of a logo, a colored font, various effects using the background color, a marquee with information on the game and greetings to friendly cracker groups. In most cases it also had music. Soon these artifacts became more spectacular than the games. While the scene always took advantage of advanced technology, various types of Demoscene artworks evolved. Each type can primarily be classified based on technical aspects.

Demoscene Material

A sampling survey of the largest web repository (Pouet 2000) of news, groups and productions shows that Demoscene artworks basically can be categorized in “Cracktros”, “Intros”, “Demos” and “Wild”. Intros are small presentations with one or two screens whereas Demos have more than two screens. Competition oriented Intros are being subdivided additionally based on size limits. Originally they were as large as a cracker could make room for the hack. Today’s PC Demos may have over 80 megabytes in size (Breakpoint 2010). Demos subdivide into platforms they are designed for. Restrictions occur through size limitation and this classification is indicative to an important quality criterion and is regarded as a constructive challenge within the scene. The general rules defining these restrictions are not standardized. On top of that some products cannot explicitly be assigned to only one category or are not being categorized at all. This especially applies for PC-based and Wild Demo art works.

In total the use of over 70 different platforms can be counted, reaching from classic platforms like Commodore 64, Amiga and Atari ST to game consoles, handhelds, mobile phones, operating systems and graphical user interfaces. Usually the activity is proportional to the actual distribution range of the platform, but also the access to appropriate development software plays a role. For the development of Demo art the “hackability” of the platform is fundamental. With much effort Demo artists analyze and reverse-engineer the hardware, based on the Demoscene rule that “the hack value of a display hack is proportional to the esthetic value of the images times the cleverness of the algorithm divided by the size of the code” (Displayhack 2012).

The category “Wild” accounts for about ten percent of the sum of Demo art works and includes insane hardware hacks and developments like reverse-engineering CPUs to figure out the opcodes, development of flashcards and coding emulators (Team Pokeme 2005). Much smaller categories are procedural graphics, executable and tracked music, games, video and web browser releases.

ELABORATED DEMO ARTISTS

Cracktros, Intros and Demos are typically executable programs. Basically they have the following main characteristics (Borzykowski 2000): They are not available for sale, they demonstrate capabilities of the graphic and musical artist and visual effects are generated in real-time. The source code of the executable computer program is not standardized and cannot be reproduced by commercial software. The complexity of these individual artworks is not comprehensible to an outsider. Neither does a non-programmer have access to the difficulty nor the programming skills in the field of undocumented hardware features, for example the creation of tricks to work around limitations of the GPU. Therefore Demo art is exemplary for technical and audio-visual sophistication and the difficult reproducibility. In this context a scene specific habit and creation process has been developed which is outlined below.

Sophisticated Programming

Laposky’s early experiments with analog switching systems are fundamental for the demonstration of the creative use of technology. Instead of oscillating voltages Csuri programmed functions and manipulated mathematical instructions with attributes. Like in Demo art sophisticated algorithms are used to display, manipulate or move objects on the screen. The more complex objects are being displayed the more impressive the demonstration will appear. A competition based on the realization of always more complex and elaborate programming tricks was started because of the limited options given by classical platforms. Object to object records were broken, better written calculation routines became faster and more efficient or new effects were discovered. The development of specific effects and designs depends on the technical skills of the artist dealing with the machine and the Demoscene’s specific handling of the existing repertoire of resources.

Focusing on programming it is not easy to make Demo art technically impressive these days and pushing the limits by just combining effects with elaborate transitions. Most methods seem to be already “on the edge” but artists still try to push the boundaries even further. Graphics artists had access to a wide range of tools, features and effects. These were limited to the original color graphics modes and the specifications of the used hardware. Again through outstanding programming achievements and pioneering spirit existing limitations could be exceeded. For example special routines allow displaying up to 128 colors instead of the original 16 colors on a C64 screen (C64 Picture Gallery 1999). The musical productions were also influenced by the available software. However, it was not uncommon to improve them and make these add-ons available for free within the scene. These production techniques resulted in graphics designers and musicians working closely together with programmers in groups to enrich and optimize their artworks. These “Demogroups” consisted of up to twenty members.
Faster processors and more computing resources became available and programming changed—away from a hardware-oriented programming style to solving more abstract mathematical problems. The use of tools for the development of eye-catchers got popular. Nevertheless, it is expected that Demo artists will demonstrate their skills by pursuing the principle to generate “flashy bits written in custom assembly language and breaking every rules” (Shatz 1993). Still, there are various approaches of developing modular Demo editors or environments. To mention an example which represents a reflection of the basic principles of the scene in dealing with resources and materials: A specially developed editor (Farbraus 2000) allows generating all textures from the corresponding parameters and demonstrates how it is possible to compile all the space-consuming data out of a set of parameters rather than integrating readily painted bitmaps as textures in the Demo data file. Thus all materials like graphics, polygon models and music is generated by program code. Running for over ten minutes and generating 1.8 gigabytes of data, the executable program is only 64 kilobytes small (Fr-08: .the .product 2000). However editors, emulators or virtualization environments are definitely being used amongst Demoscene artists.

From the impressive artifacts that challenge the computer hardware the most, also compositional principles and styles have emerged and are maintained until today (Hartmann 2010; Tasajärvi 2004).

Established Aesthetics

The structure of Demo art works is characterized by the use of classic elements. Objects got scaled up and down, rotated, deformed, moved and typically presented in fast-paced or even dancing scroll effects or animation. Graphics were animated using programmed routines. Animations were used on complex mathematically described objects and geometric shapes. Some classic old-school effects like the raster line interrupt and the Copper bar effect, both background effects that will display vertical and/or horizontal stripes of different resolution and color number on the screen, became typical for a composition. Other classic effects are tunnel flights, plasma, fire and 3D-effects. With the widespread use of PCs from the mid 90s and the related variety of hardware the community focused on computationally more intensive algorithms. A new era of the Computer Demoscene began. In contrast to home computers, Demo art on a PC may or may not work on another PC or the program code may be differently interpreted. Demo art development was changing; not only the technical masterpiece and the effects had to convince the audience, but also screen composition, color schemes and innovative ideas. Classic effects had to be reinvented or went out of fashion.

Currently the most significant contribution to the discussion about the aesthetics strategies and styles in Demo art is the doctoral thesis by D. Botz.

CRITERIA FOR THE PRESERVATION

It can be observed that the use of new platforms will always be based on the use of an existing repertoire. On the one hand active inventory, the backup and transfer of classical effects and principles of composition to new platforms is being practiced. On the other hand the new platform is used for more efficient implementation of established aesthetics. In this context new styles and principles are being developed. Besides that some artwork is ported to other platforms.

Demo art material contains static data like text, image, data lists, audio and video encoded in complex dynamic media archive files. Hundreds of different formats are available and mostly only the artists themselves have access to the original source code of the real artwork.

This leads to another important quality criteria and principle of the Demoscene: the factor “real-time”. By limiting the hardware and the size of the executable file not only comparability can be achieved but also the use of too many pre-computed animations will be avoided (Reunanen 2010). In fact, only with the knowledge of specific hardware requirements the “performance” of Demo artwork can be judged and can no longer be traced if it is isolated from the data storage medium and random access memory. But having videos of Demo art products ensures accessibility for the public.

The technical parameters which are specific for the design of Demo art are an important feature of the scene and its use of resources.

CONCLUSION

The almost overwhelming variety of designs and forms of Demo art and the lack of historical distance to identify trends make it difficult to provide a classification and establishment of this creative and cultural activity. In addition to this multi-faceted Demo art objects the diverse usage of platforms challenges the development of sustainable preservation concepts and conservation strategies. Apparently, technology comes before the artistic inspiration and Demo art is no longer existent if the platform is intended. Through porting, versioning and citation the scene itself hands down materials referred to “classic” or “old-school” design principles and compositions and make them open to the public. Development environments, editors, programming languages or software applications which complement or simplify the creative process are understood as tools. These are mostly available for free.

The outlines of the technical and creative aspects make clear that the conditions of production have led to a characteristic Demoscene artwork practice. This practice is fundamentally related to applied mathematics. It should be noted that Demoscene artists have chosen a particularly complex set of tools with computer technology as a medium. Therefore Demoscene artists practice a particular cultural technique which stands for sustainability, tangibility, creativity and craftsmanship. The creativity is basis to create innovative works and the craftsmanship represents technical skills as a form of expression. Only through the right expression Demo art can be mediated.
The objective gets even more relevant when it comes to aspects of portability or interaction. Interactivity is not only a topic for the related field of electronic games, a small number of Demos also has interactive components. These criteria will be discussed in another paper.

REFERENCES


WEB REFERENCES


BIOGRAPHIES

CANAN HASTIK studied information & science engineering at the University of Applied Sciences in Darmstadt. Since 2011 she is a PHD student in the postgraduate research study program in corporation with CIT-Cork Institute of Technology, Ireland. She is a scientific assistant at IKUM – Institute on Communication and Media. Her main research interests are preservation and accessibility of complex multimedia objects in the field of electronic games and art, usability and knowledge representation.

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